

RESEARCH, DEVELOPMENT & TECHNOLOGY TRANSFER QUARTERLY PROGRESS REPORT

Wisconsin Department of Transportation
DT1241 02/2011

INSTRUCTIONS:

Research project investigators and/or project managers should complete a quarterly progress report (QPR) for each calendar quarter during which the projects are active.

WisDOT research program category: <input type="checkbox"/> Policy research <input type="checkbox"/> Other <input checked="" type="checkbox"/> Wisconsin Highway Research Program <input type="checkbox"/> Pooled fund TPF#		Report period year: 2011 <input checked="" type="checkbox"/> Quarter 1 (Jan 1 – Mar 31) <input type="checkbox"/> Quarter 2 (Apr 1 – Jun 30) <input type="checkbox"/> Quarter 3 (Jul 1 – Sep 30) <input type="checkbox"/> Quarter 4 (Oct 1 – Dec 31)
Project title: Effective Depth of Soil Compaction in Relation to Applied Compactive Energy – Fine-Grained Soil Supplement Project		
Project investigator: Dante Fratta	Phone: 265-5644	E-mail: fratta@wisc.edu
Administrative contact: Peg Lafky	Phone:	E-mail:
WisDOT contact: Bob Arndorfer	Phone:	E-mail: robert.arndorfer@dot.state.wi.us
WisDOT project ID: 0092-08-11	Other project ID:	Project start date: 10/10/2007
Original end date: 2/10/2009	Current end date: 9/30/2011	Number of extensions: 3

Project schedule status:

☐ On schedule ☐ On revised schedule ☐ Ahead of schedule ☒ Behind schedule

Project budget status:

Total Project Budget	Expenditures Current Quarter	Total Expenditures	% Funds Expended	% Work Completed
\$103,914.00		\$85,640.42	82%	75%

Project description:

The Wisconsin Department of Transportation has requested the evaluation of appropriate lift thickness for embankment construction under common compactors equipment used in Wisconsin. The lift thickness has direct engineering and economic implications in the design, construction and performance of geotechnical systems such as embankment, foundations and roads construction. The Geological Engineering research group at University of Wisconsin has proposed a series of experimental tests to monitor the compaction effort applied and how the soil properties varied with it. In addition, field monitoring of the compaction process will be performed during the next summer season. Data collected taken from the experimental tests and the field monitoring, recommendation of appropriated lift thickness will be given considering type of soil and compactor equipment.

The proposed work plan complements the study performed on the evaluation of effective depth of compaction on coarse-grained soils. This study will collect and evaluate data from actual embankment construction operations to evaluate the effective depth of compaction on fine-grained soils.

The proposed work plan will be divided in three phases:

- I. Evaluation of the response and effect of compaction operations in fine-grained soils
- II. Establish correlations between experimental data and theoretical/numerical predictive models
- III. Draft recommendations for optimum lift thickness in Wisconsin embankment construction for coarse and fine-grained soils

Progress this quarter (includes meetings, work plan status, contract status, significant progress, etc.):

During the past two quarters, an experimental laboratory program was designed, built and tested. Several codes in Matlab were written to analyze and interpret laboratory data. For these laboratory tests, two types of soil were selected in order to be monitored under compaction for different lift thicknesses. One soil of the selected soil is well-graded sand with silt and the other soil is silt. Laboratory tests consist in monitoring the compaction effort applied to the soil and while physical (i.e., density and water content) and mechanical properties (i.e., stiffness and strength) of the compacted soils were measured for each specimen at different lift thickness and compactive effort. A total of 24 tests are being performed and the first set of tests on one the soils has been completed and the data analyzed.

The collected data were analyzed in order to verify the performance and the reliability of the test. Based on the preliminary results, the methodology and the procedure of the proposed tests were modified and corrected to better accomplish the objectives of the research project. In addition to this, the silty soil was classified and mixed at the optimum water content and is now under testing following the procedure developed while testing the well graded sand with silt.

Anticipated work next quarter:

The anticipated work for next quarter will consist in testing fined-grained soils at laboratory scale to evaluate the effect of different lift thicknesses into density, stiffness and strength. The experimental and analysis procedures developed both in the field for the original project and in the laboratory in the supplement part of the project will be used on the data collection and interpretation of the data collected in the field during this coming summer.

We will meet with DOT officials to coordinate the field data collection part of the project. It is expected that the field testing will begin this coming quarter.

Circumstances affecting project or budget:

We really need to get access to a field site early in the construction season. We are working with WisDOT officials to make sure we can complete the data collection in the early part of the Summer.

Attach / insert Gantt chart and other project documentation

Phase I - Evaluation of the response and effect of compaction operations on actual embankment construction operations

Phase II - Theoretical/numerical and experimental evaluation of compaction efforts

Phase III - Establish correlations between experimental data and theoretical/numerical predictive models

Phase IV - Draft recommendations for optimum lift thickness

Phase V – Final Report

Table 1: Project time schedule

Phase Number	1.25 Years (15 months)				
	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 5
Phase I	X	X		X (if required)	
Phase II		X	X	X	
Phase III		X	X		
Phase IV					X

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Staff receiving QPR:	Date received:
Staff approving QPR:	Date approved: